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Final Report on

Core and Crustal Geomagnetic Field modeling Using Oersted and Magsat Data

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1. Final Report:

This grant supplied funding to use Magsat and Oersted magnetic field data to model the magnetic field due to Earth's core and crust. Since the launch of Oersted was significantly delayed and no data were yet available by 5/31/99, the end of the funding period, it is perhaps fortunate that our primary goals were to develop and exploit innovative schemes for modeling the geomagnetic field, including new techniques for minimizing the influence of crustal magnetic fields in core field modelling. We were able to proceed with these efforts independently despite the lack of new observations. The work carried out under this grant has resulted in four peer-reviewed publications, with ongoing work contributing to a fifth *in press* paper by O'Brien *et al.* (2000). The research also provided significant contributions to education in the PhD theses of Michael O'Brien and Camilla Rygaard-Hjalsted. Details of the results from this work can be found in the attached copies of the published work.

2. Publications Under this Grant

Thesis

O'Brien, M.S., 1996. *Representation and Hypothesis Testing in Core and Crustal Geomagnetism*. PhD Thesis. University of California at San Diego

Papers

O'Brien, M.S., 1996. Resolving magnetic flux patches at the surface of the core. *Geophys. Res. Lett.*, **23**, 3071–3074.

O'Brien, M.S., Constable, C.G., & R.L. Parker, 1997. Frozen-flux modelling for epochs 1915 and 1980. *Geophys. J. Int.*, **128**, 434–450.

Rygaard-Hjalsted, C., C.G. Constable, & R.L. Parker, 1997. The influence of correlated crustal signals in modelling the main geomagnetic field. *Geophys. J. Int.*, **130**, 717–726.

Parker, R.L., & M.S. O'Brien, 1997. Spectral analysis of vector magnetic profiles. *J. Geophys. Res.*, **102**, 24,815–24,824.

O'Brien, M.S., R.L. Parker, & C.G. Constable, 2000. The magnetic power spectrum of the ocean crust on large scales. *J. Geophys. Res.*, in press.

Published Abstracts

O'Brien, M.S., Parker, R.L., & Constable, C.G., 1995. Global Characterization of the Crustal Magnetic Field: New Uncertainty Estimates for Core Field modeling. *EOS Transactions, American Geophysical Union*, **76(44)**, presented at San Francisco Fall AGU Meeting.

Jackson, A., C.G. Constable, & R.L. Parker, 1996. Towards a dynamically self-consistent frozen-flux model of the magnetic field. *EOS Transactions, American Geophysical Union*, **77(22)**, W144, presented at Western Pacific AGU Meeting, Brisbane, Australia.

Parker, R.L., & O'Brien, M.S., 1996. Spectral analysis of vector magnetic profiles. *EOS Transactions, American Geophysical Union*, **77(46)**, F172, presented at San Francisco Fall AGU Meeting.

O'Brien, M.S., Parker, R.L., & Constable, C.G., 1996. A global magnetic power spectrum. *EOS Transactions, American Geophysical Union*, **77(46)**, F172, presented at San Francisco Fall AGU Meeting.

Rygaard-Hjalsted, C., Constable, C.G. & Parker, R.L., 1996. The Influence of Correlated Crustal Magnetization in Main Field Modeling. *EOS Transactions, American Geophysical Union*, **77(46)**, F156, presented at San Francisco Fall AGU Meeting.

Constable, C., R.L. Parker, & C. Rygaard-Hjalsted, 1997. Including covariance in geomagnetic core-field modelling. *EOS Transactions, American Geophysical Union*, 78(17), S113, presented at Baltimore Spring AGU Meeting.